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only between two portions of matter, and that its effects on these portions of matter (measured by the momentum generated in a given time) are equal and opposite. *The stress is measured numerically by the force exerted on either of the two portions of matter*" (the italics are mine).

In making this quotation, as in making other quotations from the same authority in my pamphlet, I appeal from Maxwell the critic to Maxwell the author. The passage just quoted meets so many of the points raised by Professor MacGregor, that I shall trench upon your space no further now, except to thank Professor MacGregor for his general commendation of my pamphlet, and to say that I made my quotation from Minchin, not to support my use of the term 'inertia force,' but because of its recognition of what Minchin there calls the 'kick' of a body 'against change of motion.'

E. H. HALL.

Cambridge, Mass., Feb. 13.

### German constructions.

Permit me a few words apropos of the various letters called forth by my remarks about German scientific writings. To Mr. Eggert, who found fault with me so abundantly, there was no possibility of reply, as his motives were emotional, and criticism has nothing to take from emotion except sympathy to understand. Mr. Eggert wrote, "'M' assumes to judge of the literary qualifications of people who use a language with which he himself is less familiar than he is with French and English." I regret that he made this erroneous statement. But experience has shown, that, when people express opinions on subjects they know nothing about, they are not unapt to make serious mistakes, and so Mr. Eggert has blundered about my knowledge of languages.

In regard to Mr. Lea's sentence with the six pronouns in execrable succession: is it much worse than the following sample of what is grammatically good English?—"He said *that that that that that* man used was incorrect."

Mr. Frazer gives a sentence, which he kindly admits to be obscure, although it follows upon the expression of his admiration of the lucidity of that kind of *emboîtement* phraseology. He admires even this sentence, *Dem, der den, der die, das Verbot enthaltende Tafel abgerissen hat, anzeigt, wird hierdurch eine Belohnung zugesichert*,—"because it says in eighteen words and ninety-five letters what *cannot* [*sic!*] be literally translated into English in less than nineteen words and one hundred and four letters." A very small difference! Suppose one exclaims 'tram' 'Pferdebahnwagen,'—one word and four letters, and one word and fifteen letters; or 'wood-master' and 'Holzversorgungsinspector.' In Austria the full title of the official is *kaiserlich-königlich-Staatseisenbahnholzversorgungsinspector*. Such petty comparisons are, of course, only *jeux-d'esprit*, and have little argumentative value.

To return: the English of Mr. Frazer's perspicacious phrase might be; in strictly literal translation: "A reward is hereby promised to whomever tells who removed the warning sign,"—thirteen words and sixty-two letters; or if we put, as would be natural in English, 'notice' instead of 'warning sign,' twelve words and fifty-seven letters. There is some difficulty, as there is no exact equivalent for *Verbot*. In English, 'die das Verbot enthaltende Tafel' might well be 'notice to trespassers,' or some-

thing of the kind. It would be interesting to know what Mr. Frazer's lengthy translation was: it can hardly have been any thing but a ludicrous rendering of word for word, and not real English at all, either in spirit or construction. The example will serve my purpose: German permits very lengthy and involved sentences,—I think of my friend, a distinguished professor, who rejoiced that the twelfth part of a work on mineralogy had come; it completed, he said, the first volume, and he hoped to find the verb in the second!—a mere droll exaggeration. But what must be the possibilities of a language when such a joke about it makes one laugh? The gist of the whole matter is, that a great many German writers do display the bad possibilities of their tongue; and when Mr. Frazer says that the *best* writers seldom or never use the involved sentences, he makes an implication about the good and mediocre writers which shows that he agrees in reality with the general opinion that German authors have too frequently a faulty and obscure style. I commend to his notice Matthew Arnold's criticisms on the Germans, or Rivarol's.

M.

Boston, Feb. 10.

### On certain electrical phenomena.

At one time it was very hard for me to believe, indeed, that any person living possessed such a power as being able to shuffle across the carpet of a room, and light the gas as it issued from the jet of the burner, by simply touching it with the tip of the finger. I have at present, however, two friends, at least, among my acquaintances, who seem to be capable of performing this feat at all times, and under any circumstances. Now, I find similar phenomena exhibited to a very high degree in my own person, at Fort Wingate here. This point is over 6,000 feet above sea-level; the only water in the neighborhood is a small pond—a puddle, really—and a few insignificant springs. The air is usually clear, and highly rarified; indeed, all the conditions seem to be favorable to the exhibition of electrical appearances.

Only the other day, while pacing my room, passing, as I did so, each time, over a large woollen Navajo blanket that lay spread out on the floor, a circumstance arose which called upon me to touch the cast-iron urn that ornamented the top of a small wood-stove in the apartment, and which had a fire in it at the time. Before the tip of my index finger touched it, by a distance of fully a centimetre, there was displayed in the intervening space a brilliant electric flash, accompanied by a report that could be distinctly heard in the adjoining room above ordinary conversation. The experiment was repeated three or four times, but the display became more and more feeble with each trial; it regained its original force, however, after I paced across the blanket on the floor a few times. Additional experimentation went to show that this electrical discharge was considerably greater from the tip of the index finger than from any of the others of the hand, and gradually diminished in regular order as we proceeded to the little finger; and, further, it seemed in my case, more evident in the left index rather than in the right one. When all ten finger-tips were drawn together and then brought up to within a centimetre's distance of this stove-urn, the flash and report appeared no greater than it did from the index finger alone.

At times, apparently depending upon the meteorological conditions, my entire system seems to become thoroughly charged with this animal electricity, and most small objects crackle and snap as I handle them, leaving, as night draws near, an uncomfortable, aching sensation in my arm, and extending more or less down my side. During these same times, should my wife take any small object from my hand (as a draughting-pen, or the sponge-glass upon which such a pen is cleansed) an electrical report follows the contact, that can be distinctly heard throughout a large room. On the other hand, I had occasion to examine an injury of the back in a young mulatto girl of about fifteen years of age, a few days ago, when, with my right hand resting upon her shoulder, and my left making the required examination, there instantly followed for me a sense of the most profound relief, as if it were that all the electricity in my system had been completely withdrawn by the act. This girl, during a stay of nearly three years at Fort Wingate, has never been conscious of any electrical phenomena associated with herself, similar to those which I have experienced. Previous to coming here, I had resided about a year in Washington, where I had never observed such exhibitions, so far as my own person was concerned, and they only gradually developed at this place.

I write a great deal, sometimes six and eight hours consecutively, and I find the only kind of pen-holder that I can use with comfort is a rubber one, and even then the constant passage of the electricity is exceedingly exhausting during the most of the time. Late the other evening, having written about eight hours during the day, I threw myself upon a thick, woolen Navajo blanket which covered an iron-frame bed in my study. I was tired and nervous, and having lain there about half an hour I arose suddenly, and, being a little dazed and drowsy, I seized hold of the iron frame of the bed to steady myself: the act was followed by an electrical shock that nearly threw me to the floor, but it was not accompanied by any audible report.

R. W. SHUFELDT.

Fort Wingate, New Mexico, Feb. 8.

#### Osteological notes.

In passing through the exhibition-rooms of the Museum of comparative zoölogy not long since, my attention was called to the fact that the skeleton of the *Bison bonasus* presented a rudimentary second metacarpal, while the *Bison americanus* at its side exhibited the customary fifth metacarpal; in other words, that the single splint-bone which was present on each skeleton occupied exactly opposite positions, that of the American bison being on the outer, while that of the auroch was on the inner side of the limb. This singular difference I at once attributed to carelessness in the mounting of the preparation, without giving the matter further thought. The subject, however, being again incidentally brought up, I thought it worthy of investigation.

Close examination of the parts in question showed satisfactorily that they occupied their normal position, that the diarthrodial facet for the articulation of the osseous styloid was behind and to the inside of the superior extremity of the principal metacarpal, and that there was no corresponding facet upon the outside of the same bone.

In the ruminating sections of the artiodactyla, as is well known, the second and fifth metacarpals are

always reduced to mere representatives of their proximal extremities, and in some cases are entirely absent, as in the giraffe, prong-buck, and in some of the antelopes, as well as in the camels. In the Cervidae the three phalanges of the second and fifth digits are present, articulated to the distal ends of their respective metacarpals, which gradually taper to a point upwards. In some species, in addition, a small fraction of the proximal extremity of the fifth metacarpal is found. In the wapiti (*Cervus canadensis*) the styloid rudiments of the proximal extremities of both splint-bones are present. In the Bovinae, as a general rule, it is the rudimentary proximal end of the fifth metacarpal that is exhibited. In looking over the collection of skeletons of *Bison americanus* in the museum, I found no exception to this condition. In the skeletons of *Bos taurus*, however, although the rule held the same, there were exceptions. In one case the rudimentary proximal ends of both second and fifth metacarpals were equally developed. In several others the styloid of the second was present, but relatively very diminutive. In others, in place of a distinct rudimentary ossicle, there was an ossific deposit upon the canon-bone, simulating by its shape and position the undeveloped proximal end of the second metacarpal.

The only other skeleton of *Bison bonasus* in this country, to my knowledge, is in the possession of the Smithsonian institution. In answer to my inquiries, Mr. True, the curator, kindly wrote as follows: "I have examined the skeleton of *Bison bonasus*, and find that the metacarpals of the second and fifth digits are developed about equally at the proximal end. The largest rudiment is 55 mm. long: this is on the outside of the right leg. On the left leg, however, the larger rudiment is the inner one."

Upon the skeleton in the Cambridge museum the rudimentary metacarpals of the second digit are both equally developed, and measure 67 mm. in length, while there is not a trace of the fifth.

Owen, who is the only written authority upon the anatomy of the European bison, says in his 'Anatomy of vertebrates,' "In the bison the bones of the spurious hoofs consist, in each, of the middle and distal phalanges; and there is a styloid representative of the proximal end of their respective metacarpals articulated in the fore-foot, one to the connate trapezoid, the other to the unciform and cuneiform bones."

The modifications which prevail in the construction and number of the digits of the Ungulata are in many points of view extremely interesting. The above data are too fragmentary upon which to draw conclusions, but possibly they have their value.

D. D. SLADE, M.D.

Cambridge, Mass., Feb. 7.

#### Respiration and pulse-rate of foreign residents.

I should be pleased to learn from your subscribers, born in England or upon the continent of Europe, whether they have observed any variation in the respiration and pulse-rate since becoming citizens of the United States. The reports, to be of any scientific value, should contain full statement of any change in occupation or manner of life, as well as difference of latitude and elevation above the sea, and the effect of such variation upon the general health.

EDWARD T. NELSON.

Delaware, O., Feb. 9.